

## **REMARKS**

Applicants have received the Office Action dated June 1, 2004, (hereinafter “the Office Action”), in which the Examiner: (1) objected to claims 38, 48, and 66 because they recited a “shingle stack”; (2) rejected claims 35, 37-39, 45, 47-49, 63, and 65-67 under 35 U.S.C. § 102(e) as allegedly being anticipated by *Pai et al.* (U.S. Pat. No. 6,503,776, hereinafter “*Pai*”); and (3) rejected claims 36, 46, and 64 under 35 U.S.C. § 103(a) as allegedly being obvious in light of *Pai*, in view of *Hakey et al.* (U.S. Pat. No. 6,627,477, hereinafter “*Hakey*”) or alternatively in view of *Moden* (U.S. Pat. No. 6,512,303, hereinafter “*Moden*”). Each of the Examiner’s rejections is discussed in detail below.

With this response, Applicants have canceled claims 36, 46, and 64, amended claims 35, 45 and 63, rewritten claims 38 and 48 in independent form, and added new claims 68-70. Further, Applicants have amended the Specification on page 14, lines 9-18 to clarify the term “shingle stack.”

### **I. Claim Objections**

The Examiner objected to claims 38, 48, and 66 because they recite a “shingle stack,” and suggested that Applicants intended to recite a “single stack.” However, Applicants respectfully submit that the recitation of “shingle stack” is intended. “Shingle stack” was defined in the original specification and illustrated in the original figures. However, for clarity, the definition of the term has been more clearly set forth in the Specification at page 14, lines 9-18 as “stacks wherein upper die may overhang die below them in the stack such that their centers are not

aligned.” Moreover, Figure 5C also illustrates an embodiment where the centers of the first through the third die 82-86 are not aligned. Applicants respectfully submit that the amendments to the specification are only made to clarify the term and that no new matter is being added by the amendments to the specification.

## **II. Rejections Under 35 U.S.C. § 102(e)**

The Examiner rejected claims 35, 37-39, 45, 47-49, 63, and 65-67 under 35 U.S.C. § 102(e) as allegedly anticipated by *Pai*. Applicants respectfully traverse this rejection. Anticipation under § 102 can be found only if a single reference shows exactly what is claimed. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 U.S.P.Q. 773, 777 (Fed. Cir. 1985). For a prior art reference to anticipate under § 102, every element of the claimed invention must be identically shown in a single reference. *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990). In order to maintain a proper rejection under § 102, a single reference must teach each and every element or step of the rejected claim, else the reference falls under § 103. *Atlas Powder v. E.I. du Pont*, 750 F.2d 1569, 221 U.S.P.Q. 426, 430-31 (Fed. Cir. 1984). Accordingly, Applicants needs only point to a single element not found in the cited reference to demonstrate that the cited reference fails to anticipate the claimed subject matter.

### **A. Claims 35 and 45**

With reference to independent claims 35, 45 and 63, *Pai* does not anticipate these claims under § 102 because *Pai* fails to teach or suggest every element of the claims. The present invention relates generally to semiconductor processing and, more particularly, to a stacked die

module and techniques for forming a stacked die module. Independent claims 35, 45 and 63 each recite an integrated circuit comprising a stack comprising “at least two semiconductor die...wherein each die in the stack of at least two semiconductor die is functional.”

Conversely, *Pai* teaches a die stack where a part of the stack includes a “dummy chip” with film adhesive that adheres to other die within the stack. Col. 3, line 65 through Col. 4, line 5. The dummy chip is a die akin to other die in the stack. However, the dummy chip does not have wiring “because it is not employed in the device operation.” Col. 3, lines 20-22. In other words, at least some of the die in the stack disclosed by *Pai* are non-functional. Accordingly, *Pai* fails to teach, or even suggest, that each die in the stack is functional.

In addition, the remainder of the cited art, *Hakey* and *Moden*, also fails to teach or suggest an integrated circuit comprising a stack comprising at least two semiconductor die coupled to a substrate, wherein each die in the stack of at least two semiconductor die is functional. Specifically, *Hakey* teaches a method of achieving coplanarity between chips. Col. 4, lines 62-63; Figure 6. Since *Hakey* focuses on coplanarity, it is impossible for the chips in *Hakey* to be stacked as required by claims 35, 45 and 63. Furthermore, *Moden* teaches an interposer circuit board capable of connecting a *single* die to a master circuit board, where the die and the master circuit board do not have matching pin outs. Col. 5, lines 32-57. *Moden* therefore fails to teach a stack of at least two semiconductor die. Indeed, stacking an additional die, to create a stack on top of die disclosed in *Moden* seems implausible because electrical connections extend “perpendicularly” from the bond pads on the die to the connections on the interposer board and

the bottom die in this hypothetical stack would block these perpendicular connections. *See* Col. 4, line 51. Accordingly, *Harkey* and *Moden* both fail to teach or suggest a stack of at least two semiconductor die, where each die in the stack is functional. For at least these reasons, independent claims 35, 45 and 63, as well as their dependent claims 37, 39, 47, 49, 65 and 67 are not anticipated or rendered obvious by the cited art.

#### **B. Claims 38, 48, and 66**

With this response, Applicants have rewritten claims 38, 48, and 66 in independent form. The scope of claims 38, 48, and 66 remain the same and Applicants respectfully assert that rewriting claims 38, 48, and 66 in independent form was not done to distinguish over any of the cited art, as this is unnecessary. Indeed, every element of claims 38, 48, and 66 is not taught or suggested by the cited art. More specifically, independent claims 38, 48, and 66 each recite a stack comprising “at least two semiconductor die” where the stack is configured as a “shingle stack”. As mentioned previously, the shingle stack refers to an orientation for the stack of at least two semiconductor die, where the centers of the die in the stack are not aligned. Figure 5C depicts an exemplary embodiment of such a shingle stack. Applicants respectfully submit that none of the cited art teaches or suggests such a shingle stack configuration for a die stack, and therefore claims 38, 48, and 66 are not anticipated or rendered obvious by the cited art.

#### **V. Rejections Under 35 U.S.C. § 103(a)**

As set forth above, the Examiner rejected claims 36, 46, and 64 under § 103(a) as allegedly obvious over *Pai* in view of *Hakey*, or alternatively in view of *Moden*. In this response,

Applicants have canceled claims 36, 46, and 64 in an effort to expedite prosecution of the instant case. The cancellation of claims 36, 46, and 64 should not be interpreted as a relinquishment of the canceled subject matter. Applicants in no way concede the merits of the § 103 rejections. In fact, to the extent any pending claims are rejected as obvious on the same grounds, Applicants respectfully traverse these rejections because the cited art fails to teach or suggest every claim limitation.

### **Conclusion**

In view of the amendments and remarks set forth above, Applicants respectfully request that the Examiner withdraw all rejections of Applicants' pending claims. Furthermore, Applicants assert that claims 35, 37-39, 45, 47-49, 63, and 65-70 are allowable. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

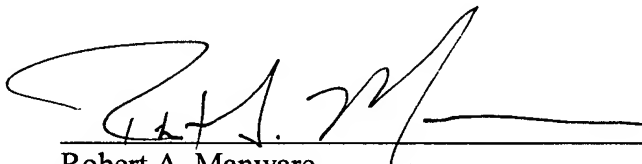
### **General Authorization for Payment of Fees and Extensions of Time**

In accordance with 37 C.F.R. § 1.136, Applicants hereby provide a general authorization to treat this and any future reply requiring an extension of time as incorporating a request therefore. The present Response is believed to be timely filed. Therefore, no extension of time is believed to be necessary. However, if an extension fee is due, Applicants authorize the Commissioner to charge the appropriate fee for any extension of time to Deposit Account No. 13-3092; Order No. MICS:78-1/FLE/MAN/ (01-0752.01).

As noted below, claims have been amended, canceled and added by this Response. In summary, three (3) dependent claims have been canceled without prejudice, two (2) dependent claims have been written in independent form and three (3) new independent claims have been submitted. As a result, the application will now contain five (5) additional independent claims and 2 overall claims beyond those for which fees have already been paid in the application. The commissioner is authorized to charge the required additional fees, in the amount of \$466.00 (5 x \$86.00, and 2 x \$18.00) to Deposit Account No. 13-3092; Order No. MICS:78-1/FLE/MAN/ (01-0752.01).

Respectfully submitted,

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